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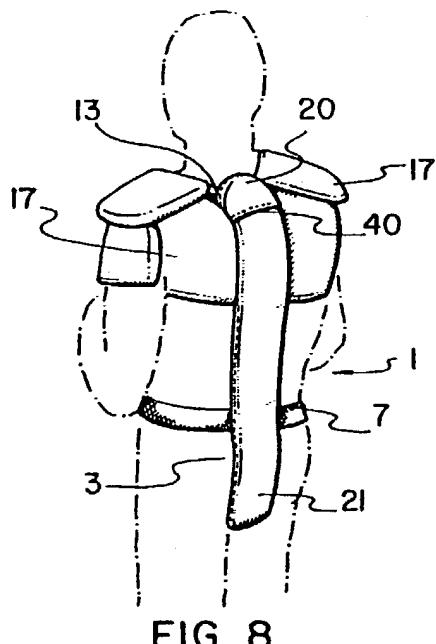
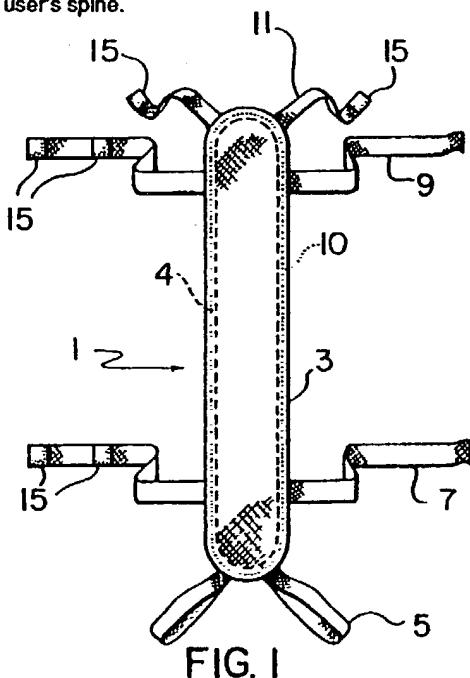
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(54) Spine protecting device

(57) A protective device to reduce the effect of impact to a user's spine, comprising a flexible unitary pad which extends along the length of the user's spine, the pad comprising at least two layers of compressible material enveloping therebetween a non-compressible flexible core layer for spreading the force of the impact, a flexible sheath to receive the pad therein, and strap connected to the sheath to secure the protective device to the user substantially over the midline of the user's spine.



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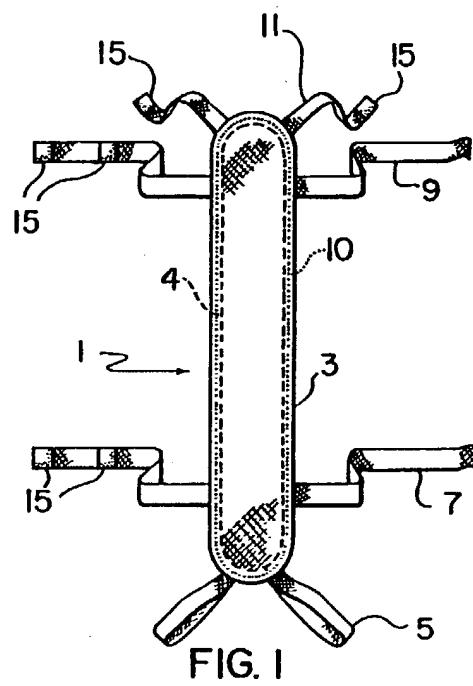


FIG. 1

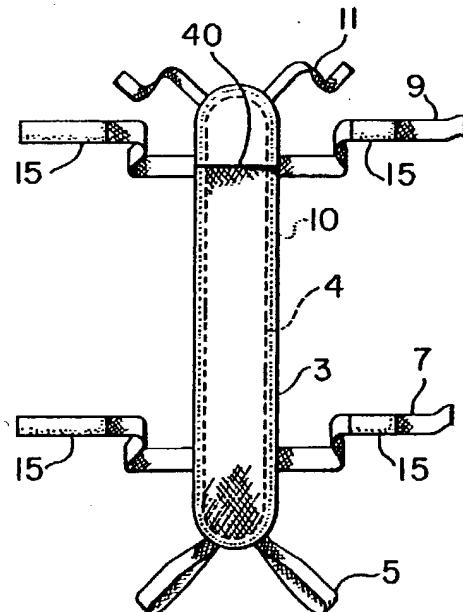
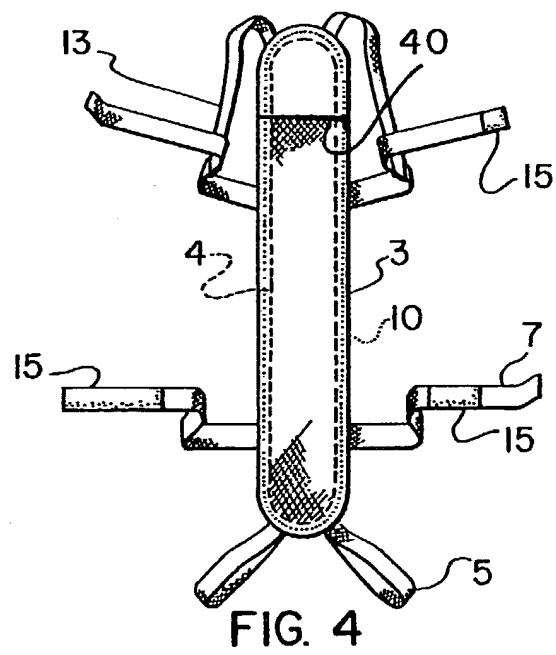
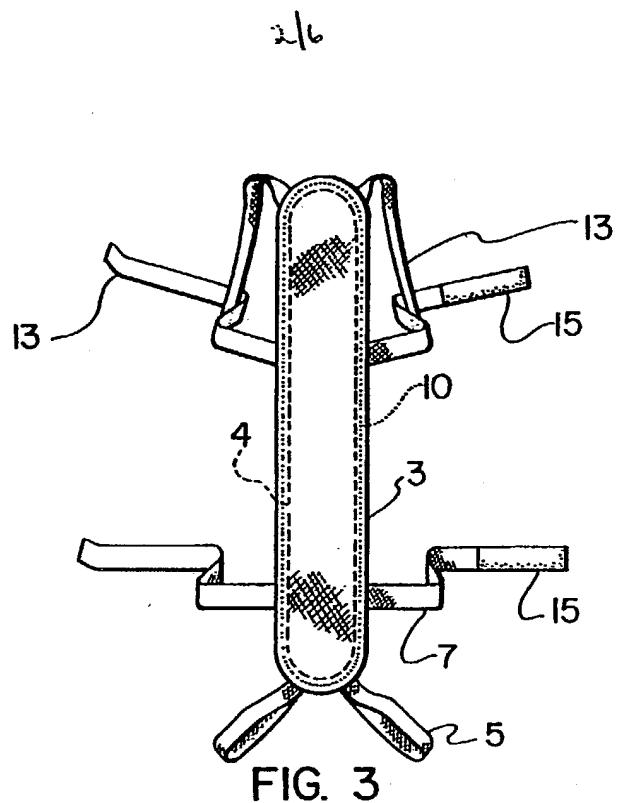


FIG. 2



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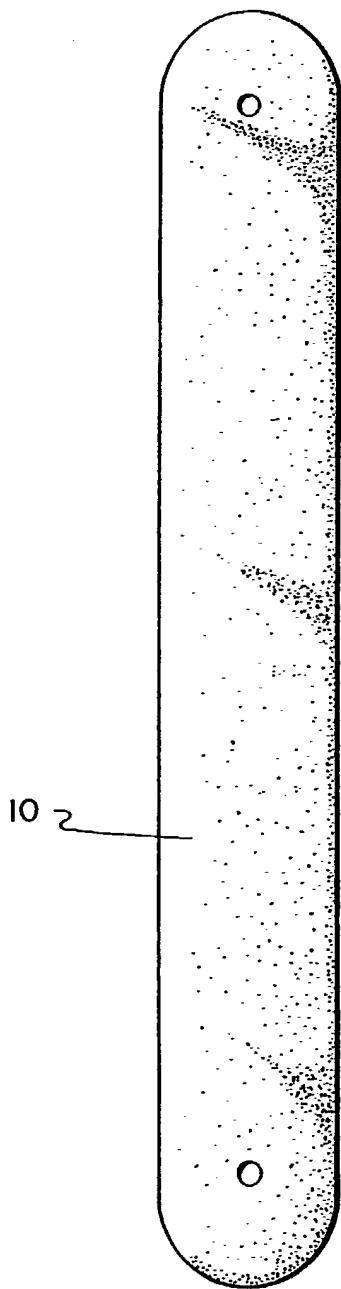


FIG. 5

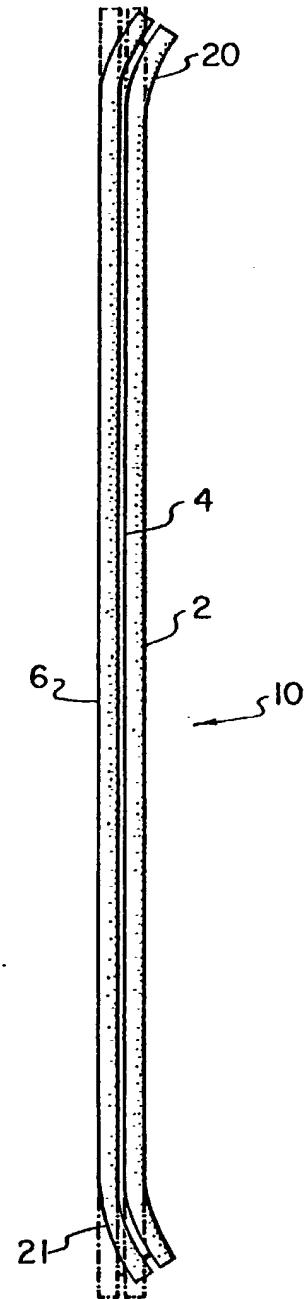


FIG. 6

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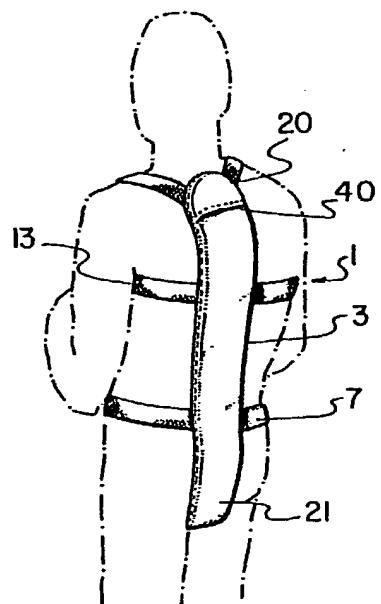


FIG. 7

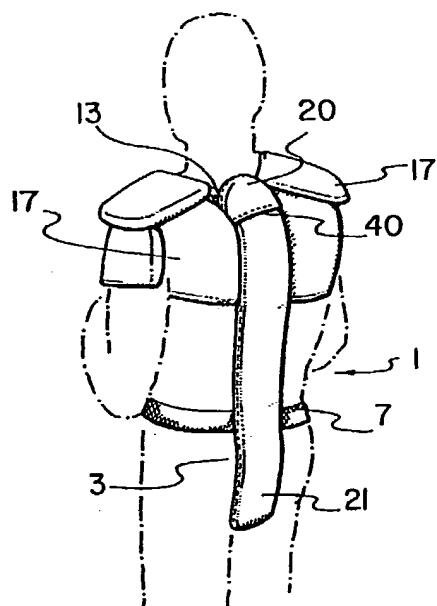


FIG. 8

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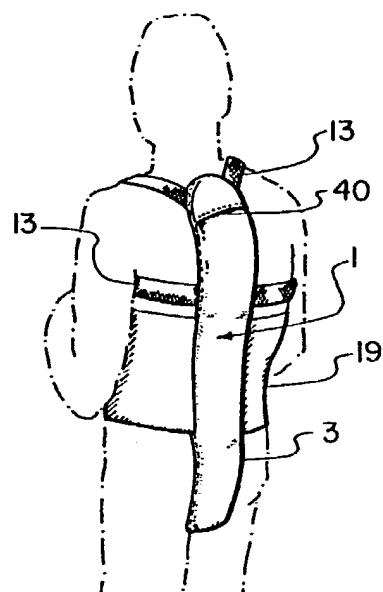


FIG. 9

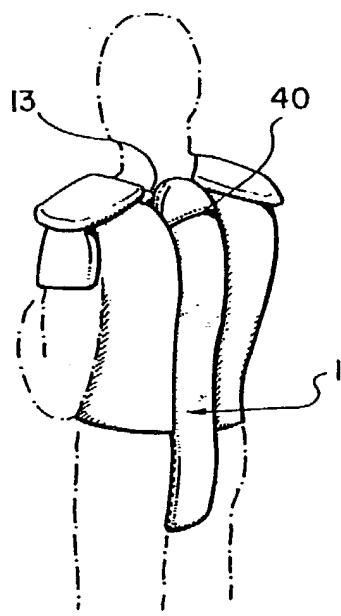


FIG. 10

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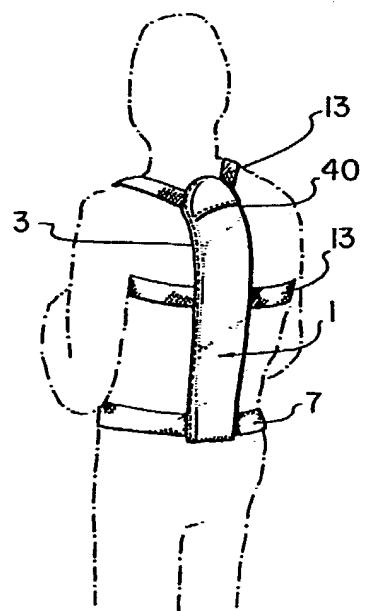


FIG. II

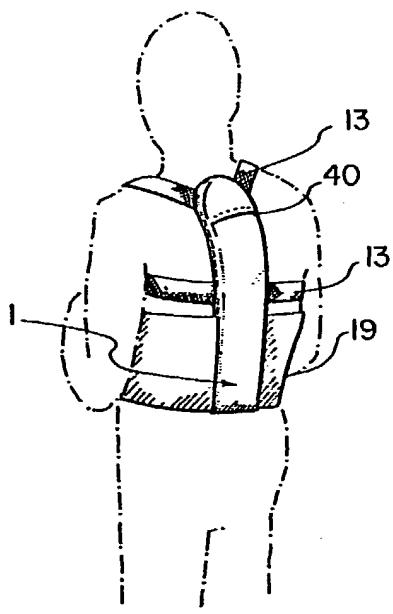


FIG. I2

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PROTECTIVE DEVICE

The present invention relates to a protective device and more specifically to a protective device to reduce the effect of impact and resulting trauma to a user's spine and other parts of the lower back and upper 5 shoulder areas.

Protective equipment such as braces and shoulder pads that are known in the art do not cover the full length of the spine of a user of such equipment. Nor do such pieces of equipment conform to the innate curvatures of the 10 thoracic kyphosis, lumbar cordosis and sacral kyphosis. As well, prior art protective equipment does not allow a full range of motion without impedance from such equipment.

The above-described disadvantages of prior art spinal protective devices may be overcome in part by the 15 use of padding curved or curvable at its top and bottom to conform or to be conformable to the curvature of the thoracic and sacral kyphosis respectively, and by attaching strapping not only near the bottom and top of the padding to respectively engage the legs, chest and shoulders of the 20 user but also attaching strapping to the padding in the region between the straps that are to engage the user's legs and the straps that are to engage the user's shoulders and chest. By attaching such additional strapping to that 25 region, known as the lumbar cordosis, when the straps of the present invention tautly but not restrictively engage one another and the user, the pad and flexible sheath of the present invention conform to the natural curvatures of the user's spine and afford the user an effective level of spinal protection. As well, the use in the present 30 invention of lightweight close cell cross-linked foam for an inner and outer layer of such pads together with a core layer of polyethylene plastic permits a full range of user motion while also providing an effective means of delocalizing the forces due to impact throughout

substantially the entire area of the padding.

According to the present invention then, there is provided a protective device to reduce the effect of impact to a user's spine comprising a unitary flexible pad means 5 to extend along the length of said user's spine, said pad means comprising at least two layers of compressible material enveloping therebetween a non-compressible resiliently flexible core member for spreading the force of said impact, flexible sheath means to receive said pad 10 means therein, and strap means connected to said sheath means to secure said protective device to said user substantially over the midline of said user's spine.

Embodiments of the invention will now be described in greater detail and will be better understood 15 when read in conjunction with the following drawings in which:

Figure 1 is a plan view of the front of one embodiment;

Figure 2 is a plan view of the back of the 20 embodiment shown in Figure 1;

Figure 3 is a frontal view of an alternative embodiment of the present protector;

Figure 4 is a rear view of the back of the embodiment shown in Figure 3;

25 Figure 5 is a plan view of the pad of the present invention;

Figure 6 is a side-elevational, cross-sectional view of the pad shown in Figure 5;

30 Figure 7 is a back perspective view of the embodiments shown in Figures 1 through 4 as worn;

Figure 8 is a back perspective view of the embodiments shown in Figures 1 through 4 further comprising shoulder pads;

Figure 9 is a back perspective view of the

embodiments shown in Figures 1 through 4 further comprising kidney pads:

Figure 10 is a back perspective view of the embodiments shown in Figures 1 through 4 further comprising 5 "body armour";

Figure 11 is a back perspective view of the present device including a shortened spine protecting pad; and

Figure 12 is a back perspective view of the 10 device shown in Figure 11 including kidney pads.

Referring to Figures 1 and 2, the protective device 1 comprises a pad 10 removably inserted into a flexible sheath 3 through a pocket-like opening 40. The flexible sheath 3 preferably is constructed of material 15 which allows for absorption of perspiration from the user, facilitates attachment of the leg straps 5, waist and lumbar straps 7, chest and back straps 9 and shoulder straps 11 and makes washing of the flexible sheath 3 possible. An example of such material is surgical 20 polycotton. Each of the straps 5, 7, 9 and 11, which are preferably made of washable elastic, has fastening means 15, such as, for example, VELCRO[®], near its ends. Straps 5, 7, 9 and 11 are attached to the sheath 3 by means, for example, of stitching.

25 The leg straps 5 are loops, each of which is capable of engaging a corresponding leg of the user, to anchor the pad 10 in the sheath 3 over the user's spine, restrict lateral movement of the pad 10 and flexible sheath 3 and to protect the user's coccyx. The waist and lumbar 30 straps 7 cause the pad 2 to conform to the curvature of the user's lumbar cordosis. The chest and back straps 9 and shoulder straps 11 further secure and conform the flexible

sheath 3, and hence the pad 10, on the user's body over the midline of the upper spine.

Referring to Figures 3 and 4, in an alternative embodiment of the present invention, respective chest and back straps 9 and shoulder straps 11 are replaced by upper torso harness straps 13.

Referring to Figures 5 and 6, pad 10 has an inner layer 2, a core layer 4, and an outer layer 6, which are joined to one another by means, for example, of glue. 10 Preferably, inner layer 2 and outer layer 6 are of closed cell cross-linked foam that will not remain compressed after impact and will dampen the traumatic forces which would otherwise be applied directly to the user. Pad width, foam cell size and density allow the pad 10 to fit 15 into the spinal groove between the user's paraspinal musculature. In one embodiment constructed by the applicant, layer 2 and outer layer 6 are each a 3/8 inch thickness of closed cell polyethylene foam. As depicted in Figure 6, the edges of layers 2 and 6 overlapping core 4 20 are not glued together and are therefore spaced apart. In use however, these edges typically are glued together so that layers 2 and 6 totally envelop and enclose the core.

As is known to those skilled in the art, polyethylene plastic is resiliently flexible and retains 25 its shape with use. Constructing core layer 4 of polyethylene plastic therefore results in pad 10 being flexible to accommodate the user's motion and also spreads the focus of the traumatic forces, which would otherwise be localized at the point of impact, outwards from the point 30 of impact over the remaining area of pad 10. Core 4 may suitably be 0.085 inches thick.

In the embodiment shown in Figures 5 and 6, upper and lower ends 20 and 21 of pad 10 are inwardly curved by forming core 4 at its respective ends to have the required

degree of curvature, the purpose of the curvature being to better conform the shape of pad 10 to the shape of the user just beneath the neck and below the base of the buttocks. Such additional preformed curvature is not required or in 5 some cases even desired, depending upon the sport, and in another embodiment contemplated and constructed by the applicant, the cross-sectional profile of pad 10 is substantially straight, as shown in dotted lines in Figure 6.

10 Referring to Figures 7 through 11, the embodiments of the present invention shown in Figures 1 through 4 may be attached, for example by means of stitching, respectively, to shoulder pads 17 (Figure 8) or kidney pads 19 (Figures 9 and 12) or a combination of 15 shoulder and kidney pads 25 to form "body armour" as shown in Figure 10. Referring to Figure 8, shoulder straps 11 and shoulder pads 17 are attached to one another and to the flexible sheath 3 by means, for example, of stitching. Referring to Figure 9, kidney pads 19 are attached to waist 20 and lumbar straps 7 (not shown) and to flexible sheath 3 by means, for example, of stitching.

As will now be apparent to those skilled in the art, the present invention reduces the incidence of contusion and concussion to the thoracic, lumbar and sacro 25 cocygeal areas of the spine by absorbing initial trauma, and spreading the force of blows through the core layer 4 and over a greater area than the focal point of the trauma and thus reducing the incidence of injury or fracture of the transverse processes of the spine.

30 As will also be apparent to those skilled in the art, the pad 10 and flexible sheath 3 may be constructed in a shorter length, and without leg straps 5, as shown most clearly in Figures 11 and 12, to accommodate, for example, football running backs.

As will also be appreciated, pad 10 may consist entirely of compressible foam material without core layer 4, particularly for sports and activities where the risk of relatively high impact traumas is lower.

It will be obvious to those skilled in the art that the scope of the present invention is not restricted to the embodiments disclosed above, but may instead be varied within the scope of the following claims without departing from the spirit and scope of the invention.

CLAIMS:

1. A protective device to reduce the effect of impact to a user's spine, comprising:
 - unitary flexible pad means to extend along the length of the user's spine, said pad means comprising at least two layers of compressible material enveloping therebetween a resiliently flexible non-compressible core member for spreading the force of said impact;
- 10 flexible sheath means to receive said pad means therein; and strap means connected to said sheath means to secure said pad means to said user substantially over the midline of said user's spine.
- 15 2. A protective device according to claim 1, wherein said strap means comprise lower torso straps to engage the waist and lumbar regions of said user and upper torso straps to engage the back, chest and shoulders of said user.
- 20 3. A protective device according to claim 1 or 2, additionally comprising a pair of looped straps each of which is capable of engaging a corresponding leg of said user.

4. A protective device according to any one of claims 1 to 3, wherein said strap means are adapted, when in use about the user's body, to conform the shape of said pad means substantially to the curvature of said user's spine.
5. A protective device according to any one of the preceding claims, wherein either or both of an upper end and a lower end of said pad means is permanently curved to be in use in a direction towards said user.
- 10 6. A protective device according to any one of the preceding claims, wherein said at least two layers of compressible material comprise closed cell cross-linked foam, said two layers being glued together to enclose said core member therebetween.
- 15 7. A protective device according to any one of the preceding claims, wherein said flexible core member comprises a substantially planar sheet of polyethylene plastic.
- 20 8. A protective device according to any one of the preceding claims, wherein said pad means are adapted to extend substantially from the top of the spine to the top of the user's legs, when in use.

9. A protective device according to any one of claims 1 to 7, wherein said pad means extend from the upper end of said spine to proximally said user's coccyx.

5 10. A protective device according to any one of the preceding claims further comprising shoulder pads and/or kidney pads.

10 11. A protective device to reduce the effect of impact to the user's spine comprising flexible pad means to extend along the length of the user's spine for spreading the force of said impact, flexible sheath means to receive said pad means therein, and strap means connected or connectable to said sheath means to secure said pad means to said user substantially over the midline of said user's spine.

15 12. A protective device for the human spine comprising flexible compressible pad means for extending along the length of the user's spine, and strap means for centering said pad means along substantially the midline of said spine.

20 13. A protective device to reduce the effect of

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impact to a user's spine, substantially as herein described and as illustrated in the accompanying drawings.